Center for Independent Experts (CIE) independent peer review report for the 2016 assessment of Black Sea Bass and Witch Flounder

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Executive Summary

The following is a summary of the conclusions regarding the two stocks.

The two assessment reports provided complete and comprehensive descriptions of the data available and the assessment work that had been conducted. All TOR's were addressed in detail. The material was well organized and background documents were provided and properly referenced. The analyses were all of high quality and transparently described. The presentations at the review meeting allowed for clarifying questions, which were all answered clearly and satisfactorily. The panel requested a few additional comparisons and graphs, which were promptly produced.

Black sea bass

The panel accepted the assessment recommended by the assessment working group as the basis for management.

The assessment procedure consists of 1) dividing the stock into two stock units (North and South of Hudson Canyon), 2) running a separate Age Structured Assessment Program (ASAP) assessment model for each sub-unit, and 3) combining the results to provide advice for the combined stock.

Important model diagnostics (retrospective patterns) indicated that the two sub-units were not individually accurately described, so inference for each sub-unit should be skeptically evaluated (especially for the most recent years). The problem canceled out for inference about the combined stock.

Black Sea bass is not overfished and overfishing is not occurring. This conclusion was shown to be robust to several model configurations and an independent assessment model.

Witch flounder

The panel did not accept the assessment procedure recommended by the assessment working group as the basis for management.

The model presented (ASAP) is generally scientifically sound, part of the NOAA toolbox, and accepted for several stocks. The review panel also did not suspect any errors in its configuration for Witch flounder. However, important model diagnostics (mainly retrospective patterns) indicated that the model did not adequately describe the dynamics in the data, or that the different data sources were in conflict with each other, in such a way that the estimates for the most recent years were biased. Bias-adjustments of the final years' estimates, based on the recently observed biases, could be misleading in some situations, and was not recommended by the panel.

In the assessment report and later in public comments, several scenarios, which diminished the biased model behavior, were presented, but they were leading to implausible/surprising multipliers or selection patterns, which would require further scrutiny. These scenarios did not provide a convincing answer to what was really causing the retrospective pattern observed.

The previously accepted VPA approach showed similar problematic model diagnostics with the current data, so the panel could not recommend that approach.

The assessment working group also prepared an ''empirical area swept method'', which the panel recommends that the NEFMC SSC consider using as the basis for developing management advice.

Background

This report is prepared for the Center for Independent Experts (CIE). It contains an independent and impartial review.

The 62th SARC review meeting was held in Woods Hole 29 Nov. - 2 Dec. 2016. The assessments under considerations were for black sea bass and witch flounder. The lead presenters were Dr. Gary Shepherd and Dr. Susan Wigley respectively. The review panel was composed of Vivian Haist, Neil Klaer, and Anders Nielsen. The meeting was chaired by Patrick J. Sullivan.

Approximately 2 weeks prior to the meeting, the review panel members were given a link to an ftp site with background documents (appendix 1). This reviewer's statement of work can be found in appendix 2, and a list of review meeting participants in appendix 3.

Description of this reviewer's role

This reviewer has independently read all documents in preparation for the review, traveled and participated actively in the review meeting, identified key issues in the assessment, contributed to the summary assessment report, review panel's summary report, and independently authored this review report.

Black Sea Bass

Findings for each term of reference

To ensure that all terms of reference are covered, and that comments are interpreted with reference to the correct terms, the terms are listed in gray with corresponding reviewer comments following.

1. Summarize the conclusions of the February 2016 SSC peer review regarding the potential for spatial partitioning of the black sea bass stock. The consequences for the stock assessment will be addressed in TOR-6.)

This TOR was completed satisfactorily.

The spatial partition of black sea bass has been presented to the panel of the Mid Atlantic Fishery Management Council. The panel agreed with the split at the Hudson Canyon as a starting point for assessment modelling.

2. Estimate catch from all sources including landings and discards. Characterize the uncertainty in these sources of data. Evaluate available information on discard mortality and, if appropriate, update mortality rates applied to discard components of the catch. Describe the spatial and temporal distribution of fishing effort.

This TOR was completed satisfactorily.

The commercial landings are coming from four different gear types (pots, bottom trawl, handline, and other).

The two dominant gear types of the commercial fishery are pots and bottom trawl. The relative distribution of landings from the four gear types is fairly constant over time from 1989, except that landings are lower from pots (ca. 2008-2014) and bottom trawls (ca. 2008-2013).

Commercial market categories (small, medium, large, jumbo, and unclassified) are used to apply length distributions by region, half year, and gear category (trawl/non-trawl), and age-lengths keys are applied. The age-length keys are primarily from trawl survey and based on scale readings, but from 2012 commercial age sampling is available, and from 2015 otolith readings are used. Commercial discard mortality rates were set to 100% for trawl and sink gillnets (other) and to 15% for pots and handline gear types.

The catch (landing and discard) from recreational fishing is an important component. Recreational catch is as big as commercial catch in the southern region and bigger in the northern region (in the recent period). Estimates of recreational catch come from the Marine Recreational Information Program

(MRIP) and its predecessor (MRFSS), which includes length sampling. Discard mortality from recreational fishing was set at 15%.

As the recreational fishing is such a big part of the total catches, it can be expected that the uncertainty on the total removals is large compared to assessments dominated by a more controlled and monitored commercial fleet.

3. Present the survey data being used in the assessment (e.g., indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of fishery dependent indices as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.

This TOR was completed satisfactorily.

Many survey indices are available for Black sea bass. Each index is well described in the assessment report. They vary in spatial coverage, time of year, data types and more. A summary table was extended, by request of the reviewers, to the following (Table 1), which is very useful.

Table 1: Summary of survey indices for black sea bass.

Index Name	Assessed Area	Season	Location	Years	Fishery Independent	Type	Age Range	Filter Method	Derivation Method	Data	Spatial Range	Rank
NEFSC Winter Bottom Trawl Survey	S	Feb-Mar	Offshore	1992-2007	Yes	Absolute	1-8+	Strata subset	Stratified mean	Len,Wt & Age	Wide	3
NEFSC Spring Bottom Trawl Survey ALBATROSS	N + S	Mar-May	Offshore	1989-2008	Yes	Absolute	1-8+	Strata subset	Stratified mean	Len,Wt & Age	Wide	2
NEFSC Spring Bottom Trawl Survey BIGELOW	N + S	Mar-May	Offshore	2009-2015	Yes	Absolute	1-8+	Strata subset	Stratified mean	Len,Wt & Age	Wide	3
MA Resourse Assessment Trawl Survey	N	May	Inshore	1989-2015	Yes	Relative	1-8+	Strata subset	GLM	Length	Narrow	4
RI Seasonal Bottom Trawl Survey	N	Apr-May	Inshore	1989-2015	Yes	Relative	1-8+	All Strata	GLM	Length	Narrow	4
CT Long Island Sound Trawl Survey	N	May-Jun	Inshore	1989-2015	Yes	Relative	1-8+	All Strata	GLM	Length	Narrow	4
NY Small Mesh Trawl Survey	N	May-Jul	Inshore	1990-2015	Yes	Relative	1	Max length	GLM	Length	Narrow	5
NJ Ocean Trawl Survey	S	Jun	Inshore	1989-2015	Yes	Relative	1-8+	All Strata	GLM	Length	Medium	4
DE 16ft Trawl Survey	S	Apr-Jun	Inshore	1989-2015	Yes	Relative	1	Max length	Stratified mean	Length	Narrow	5
MD Coastal Bays 16ft Trawl Survey	S	May-Jun	Inshore	1989-2015	Yes	Relative	1	Max length	Stratified mean	Length	Narrow	5
VIMS Juvenile Fish and Blue Crab Trawl Survey	S	May-Jul	Inshore	1989-2015	Yes	Relative	1	Max length	Stratified mean	Length	Narrow	5
NEAMAP Ocean Trawl Survey	N + S	Apr-May	Coastal	2008-2015	Yes	Relative	1-8+ (N), 1 (S)	All Strata	Stratified mean	Len,Wt & Age	Medium	3
Recreational CPUE	N + S	Mar-Dec	Coastal	1989-2015	No	Relative	1-8+	Multi-Species effort	GLM	Length	Wide	1

Ranked by
Area coverage
Time series length
Ages represented

Many of the subjects discussed at the review meeting can be seen directly from the table, for example, where the age data were collected (primarily from the NESFC surveys), the change from the R/V

Albatross to the R/V Bigelow in the NESFC survey in 2009, and the period and spatial range of the different series.

The recreational CPUE index is the only fisheries-dependent index. It is developed using effort targeting species commonly caught with Black sea bass.

The indices will obviously have different bias and precision relative to the population, and the ranks in the last column in table represent a subjective ranking from members of the assessment team, but based on age, time and area coverage.

Another way to compare the quality of survey indices is to compare the internal and external consistency. This is routinely done in ICES working groups by plotting individual age groups against each other (e.g., age 2 survey 1 vs age 2 survey 2 for external consistence and e.g., age 2 survey 1 vs age 3 survey 1 lagged one year for internal consistency). See for instance pages 130 - 133 in the (randomly selected) report:

http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKPLE/WKPLE2015.pdf

4. Consider the consequences of environmental factors on the estimates of abundance or relative indices derived from surveys.

This TOR was completed satisfactorily.

A presented study showed that depth, salinity, and temperature were influencing the state surveys. The state survey indices were adjusted using the found covariates. The relative trends were largely unchanged.

5. Investigate implications of hermaphroditic life history on stock assessment model. If possible, incorporate parameters to account for hermaphroditism.

This TOR was completed satisfactorily.

The key concern when dealing with a stock with a hermaphroditic life history is that the defined biological reference level does not ensure a balanced sex ratio. Black sea bass is a protogynous hermaphrodite, so size selective fishing can impact the sex ratio.

Case-targeted simulations showed that black see bass was more resilient to exploitation, because the sex ratio was not 100% males at larger sizes.

Further simulations showed that sex-aggregated assessment models performed well, even when the simulation model used the sex-structure of black sea bass.

Empirical data to correctly incorporate hermaphroditism in the assessment model is not available, so the working group used both males and females when defining SSB.

6. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock), using measures that are appropriate to the assessment model, for the time series (integrating results from TORs-1,-4, & -5 as appropriate), and estimate their uncertainty. Include a historical retrospective analysis and past projection performance evaluation to allow a comparison with most recent assessment results.

This TOR was completed satisfactorily.

The Age Structured Assessment Program (ASAP) is part of the NOAA Fisheries Toolbox (http://nft.nefsc.noaa.gov/). The model is best described by the technical manual, which is part of the downloaded package from the toolbox. For future ASAP-based assessments, it would be relevant to include the technical manual in the background reading material. The model is configurable to many different situations and the source code for the model is available from the toolbox, which ensures the ultimate flexibility. The ASAP model has been used for many accepted assessments and is considered, by this reviewer, to be a well-tested, sound, and robust assessment model.

Three ASAP model configurations were presented. 1) overall: considering the stock as a single unit. 2) Two area: model considering the stock as two separate stock units (North and South of Hudson Canyon). 3) Area exchange: model considering two areas with exchange between areas in the offshore fishery and surveys.

The area exchange model was primarily used to illustrate how sensitive the model results were to exchange different fractions of the stock in the fishery and surveys. Results showed that results (for the combined) stock was not very sensitive.

The three final models showed very similar results for the key parameters for the combined stock (Figure A153). The model diagnostics were more variable. The overall model did not have a problematic retrospective pattern (Figure A57-A62). The two-area model did have major retrospective pattern in both the northern sub-unit (Figure A99-A106) and the southern sub-unit (Figure A141-A145). The interesting thing is that for inference (and advice) with respect to the total combined stock, when combining the two area runs, the retrospective patterns canceled each other out. These retrospective plots were created by request of the reviewers (see an example in figure 1).

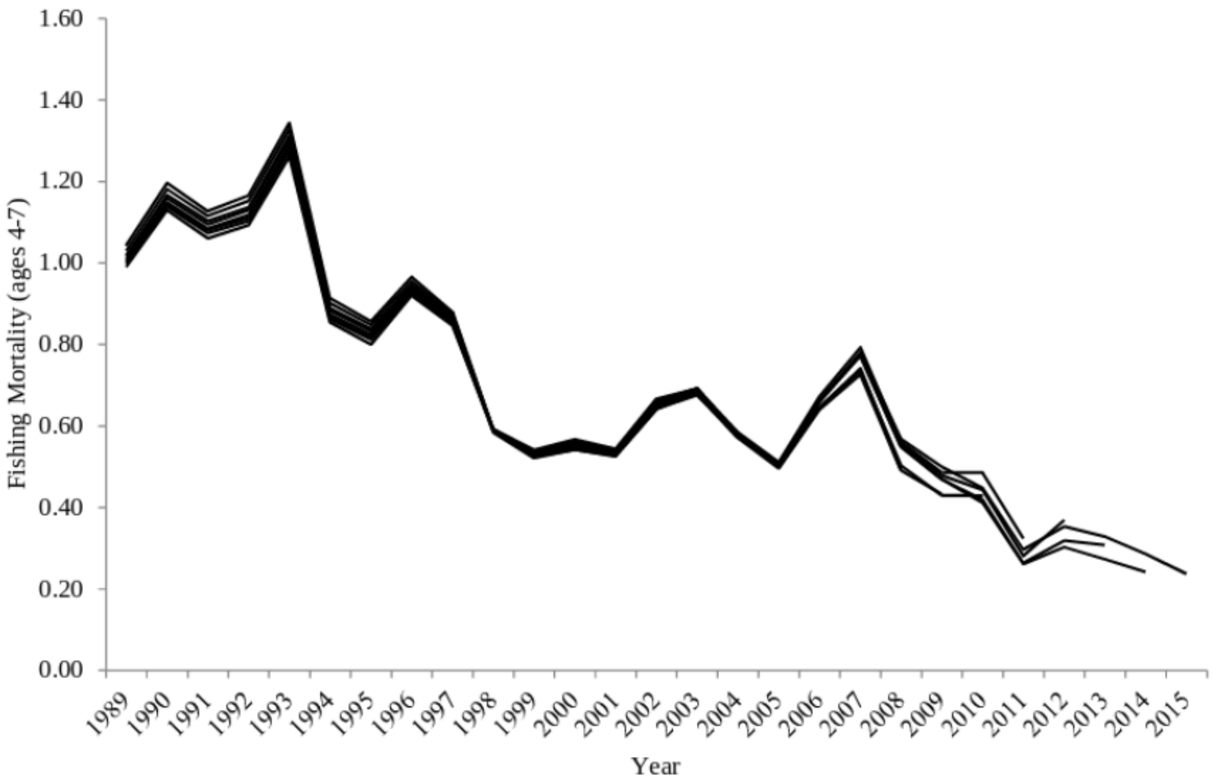

Figure 1: F-retro plot of the northern and southern models combined

There were large similarities between residual patterns seen in the overall model and in the two area models. Auto-correlated residuals were seen in the overall model (e.g. figure A54) and in the two-area northern sub-unit (e.g. figure A73) and southern sub-unit (e.g. figure A115).

Having seen the model diagnostics and major retrospective pattern of the two area model, the obvious model candidate would seem to be the overall model, because the two area model 1) is more complicated, 2) did have a strong retrospective pattern in each sub-unit, and 3) did not overwhelmingly improve the model residuals. The working group did, however, point to fits to specific surveys, which did improve (e.g., figure 2) and further noted that having the model results for each sub-unit did provide extra insights into the stock dynamics.

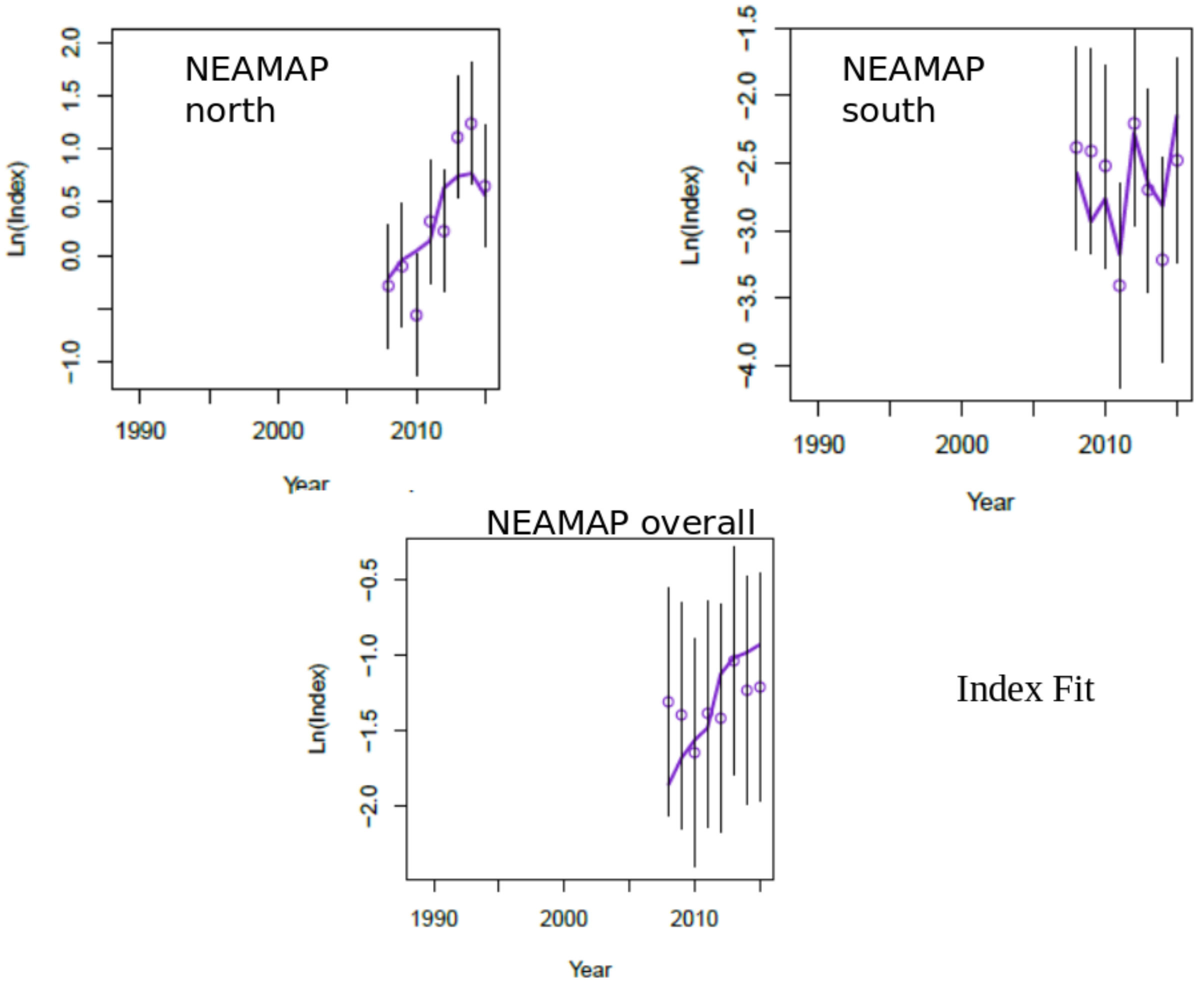

Figure 2: Fit to a specific index of the two area model (North and South) and the overall model

It is important to note that seeing a major retrospective pattern in both sub-units is a strong indication that something is mis-specified in our two-area model. It is therefore important that the model results for each sub-unit are viewed with some skepticism, especially in the last data years.

The combined results from two-area model are accepted as the basis for providing management advice about the combined stock.

The combined results from the two-area model were compared to an implementation in Stock Synthesis (SS3). Stock Synthesis is another well validated model, which has been used in numerous accepted assessments. The overall trends are very similar (see figure 3), which further strengthens confidence in the two-area ASAP approach.

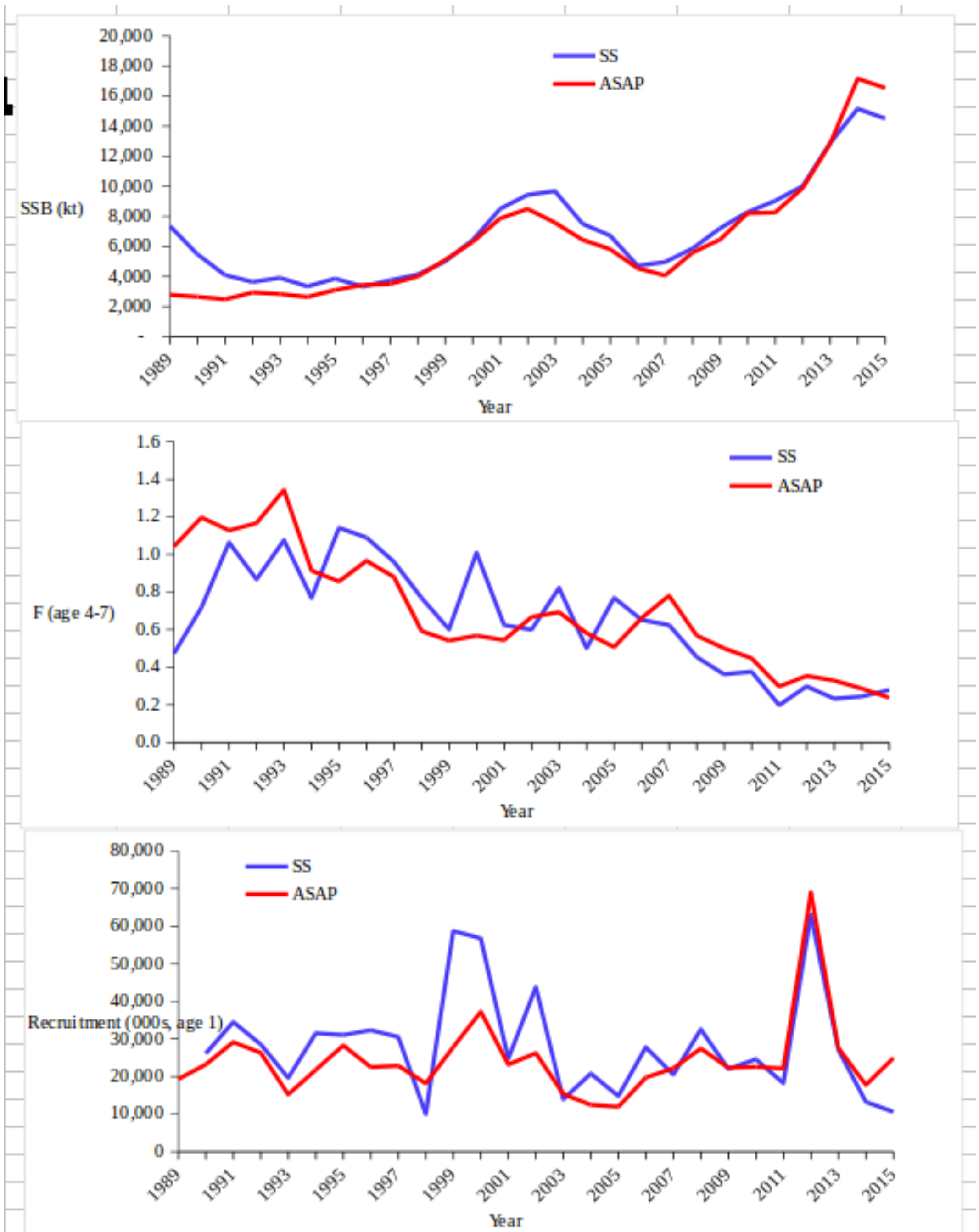

Figure 3: The combined results from the two area model compared to an implementation in Stock Synthesis

7. Estimate biological reference points (BRPs; point estimates or proxies for BMSY, BTHRESHOLD, FMSY, and MSY), including defining BRPs for spatially explicit areas if appropriate, and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the

appropriateness of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.

This TOR was completed satisfactorily.

The stock recruitment part of the assessment is specified as deviations from a mean value (steepness is fixed at one), but the deviation penalty is set low (CV of 1), so essentially recruitments are estimated as free model parameters.

There is however no convincing stock-recruitment relationship, so F40% is used as proxy for Fmsy. The F40% is calculated in each spatial sub-unit and then averaged (the resulting Fmsy proxy became 0.36).

To estimate the corresponding biomass reference point a long term projection was performed, but for the combined stock, and not for each spatial sub-unit. This is a shortcut, and somewhat inconsistent with the assessment model, but acceptable because of the long term perspective and the similarity of the overall model and the combined two area approach.

The forward projection used samples from the empirical recruitment estimates from the 2000-2015 period, and averages of needed biological parameters for the 2013-2015 period. The stock was projected for 100 years, and the average of the final 20 years was used to calculate the biological reference points. The most important is the proxy for Bmsy, which came out as 17256MT.

There were no accepted reference points from the previous assessment.

8. Evaluate overall stock status with respect to a new model or new models that considered spatial units developed for this peer review.

This TOR was completed satisfactorily.

The combined stock is not overfished and overfishing is not occurring.

The combined two-area model shows that the biomass in 2015 is 40% above the proxy for Bmsy and F in 2015 is 35% below the proxy for Fmsy.

The same conclusion could be drawn on the basis of the overall model and on the independent implementation in stock synthesis, which further strengthens confidence in this conclusion.

Notice that the final year’s estimates from each spatial sub-unit must be expected to be biased, so these estimates should not be used in isolation. The expected bias cancels out when the estimates are combined into total stock estimates.

9. Develop approaches and apply them to conduct stock projections.
   a. Provide numerical annual projections (3-5 years) and the statistical distribution (e.g., probability density function) of the OFL (overfishing level) that fully incorporates observation, process and model uncertainty (see Appendix to the SAW TORs). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of

falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment, and definition of BRPs for black sea bass).

b. Comment on which projections seem most realistic. Consider major uncertainties in the assessment as well as the sensitivity of the projections to various assumptions.

c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

This TOR was completed satisfactorily.

Short term projections are carried out in each spatial sub-unit and results are summed to get projections for the combined stock. This is consistent with the accepted model.

The uncertainty in the final year's estimate is represented by an MCMC sample from its posterior distribution. The recruits used in the projections are sampled from the smoothed empirical distribution of estimated recruits in the 2000-2015 period. The estimation uncertainty and recruitment process uncertainty are propagated through in the projections. The statistical distributions of the projected quantities are summarized by their means and standard deviations. Results would target the TOR even closer if the probabilities of SSB below the threshold in the projected years were directly listed.

[The report states in p.62 that a geometric mean of estimated recruits is used in the projections. This is not correct].

Projections are carried out for two fishing scenarios, F at status quo and F at Fmsy(proxy).

Model/method sensitivities are explored by comparing projections with and without rho-adjustment and a projection from the overall combined model. If short term projections were also supplied it would strengthen the model sensitivity runs. The rho-adjusted projection seems most realistic.

Note that even though projections are conducted for each spatial sub-unit they should only be used in combination, because of the major retrospective issue within each spatial sub-unit.

10. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

This TOR was completed satisfactorily.

The research recommendations from recent assessments are listed and progress on each recommendation is described. Further research recommendations from the assessment working group are put forward.

The existing recommendations include: multiple age-structured models, species specific surveys, expand tagging, genetic studies, sex-change research, age reading validation, climate impacts, study catchability in gear types, investigate social and spawning dynamics, habitat studies, and evaluate use of industry samples.

The assessment working group expressed concern about how to convince managers about their estimated uncertainty levels. To address this, the following two research recommendations are made: 1) Research into using self-weighting models. Uncertainty estimates of estimated quantities are obtained by propagating observation uncertainties through the models. When observation uncertainties are subjectively assigned, then so are the uncertainties of the results. 2) Application of prediction-based methods to validate that actual prediction uncertainties correspond to estimated prediction uncertainties.

Witch Flounder

Findings for each term of reference

To ensure that all terms of reference are covered, and that comments are interpreted with reference to the correct terms, the terms are listed in gray with corresponding reviewer comments following.

1. Estimate catch from all sources including landings and discards. Describe the spatial and temporal distribution of landings, discards, and fishing effort. Characterize the uncertainty in these sources of data.

This TOR was completed satisfactorily.

The catches consist of landings and discards. Discards are the smallest part ranging between 3 and 30 percent. Discard mortality is assumed to be 100%. Discard estimates are more uncertain than landing estimates. The working group had refined the discard estimation compared to previous working groups by separating into more gear types and expanding area. There are no recreational catches. The spatial and temporal distribution is illustrated.

Length sampling is available from 1982-2015, but during the 90's it was insufficient for some combinations of quarter and market categories, so those had to be pooled (share samples with neighboring categories). Commercial age data is available from 1982-2015.

The estimation of total removals follows standard practice. One added uncertainty factor to be mindful of is that catch misreporting is currently under litigation.

2. Present available federal, state, and other survey data, indices of relative or absolute abundance, recruitment, etc. Characterize the uncertainty and any bias in these sources of data and compare survey coverage to locations of fishery catches. Select the surveys and indices for use in the assessment.

This TOR was completed satisfactorily.

The available survey information was presented. The two main surveys are the random stratified bottom trawl surveys conducted by the Northeast Fisheries Science Center (NEFSC) in autumn and in spring. The two time series are largely not interrupted, but in 2009 the vessel was changed. A constant (over ages) conversion factor of about 3.3 has since been applied. A swept area experiment was conducted to convert the relative surveys into absolute swept area based estimates.

In addition to the NEFSC surveys inshore surveys from Massachusetts Division of Marine Fisheries (MADMF) and from Maine Department of Marine Resources / New Hampshire Fish and Game Department (MENH). The MADMF is conducted spring and fall, but has spatial coverage confined to the inshore waters and has low fraction of positive tows. The MENH is conducted spring and fall. It has limited coverage, but is considered to cover much of the juvenile range, so is potentially informative about recruitment.

An August shrimp survey is available from Atlantic States Marine Fisheries. There is a high fraction of positive tows for Witch flounder, but no age information is collected for Witch flounder. A combination of the age-length keys from the two NEFSC surveys are applied.

Fishery depend data are also available in the forms of landing per unit effort (LPUE). The working group put a lot of effort into selecting the optimal/most representative sub-set and standardizing the data to make it most useful. Concerns remained about a long list of potential biases in this index, some were: Dealer data contained only landings, dealer data contain only positive trips, vessel trip reports had remarkable low reported discard rate, observers on the boats could lead to different behavior, effects of changes in regulations, and finally effects of technical innovations (fish-finding and positioning electronics and fishing gear).

3. Investigate effects of environmental factors and climate change on recruitment, growth and natural mortality of witch flounder. If quantifiable relationships are identified, consider incorporating these into the stock assessment.

This TOR was completed satisfactorily.

Studies showed some significant changes in temperature and depth of witch flounder, but size of changes were small, and no influence on recruitment was evident.

4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from TOR-3 if appropriate), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results and previous projections. Compare F's and SSB's that were projected during the previous assessment to their realized values.

This TOR was completed satisfactorily, but the model proposed by the working group was rejected by the review panel, mainly because of a major retrospective pattern.

The Age Structured Assessment Program (ASAP) is a very general model written in the optimization software AD Model Builder. ASAP has been used for many accepted assessments. ASAP is part of the NOAA Fisheries Toolbox (http://nft.nefsc.noaa.gov/), where the source code is also available. ASAP is setup to be configurable to deal with many different data situations. Furthermore, one of ASAP's authors (Dr. Christopher M. Legault) is part of the working group, and as such is available to customize ASAP's code base if needed. This reviewer is convinced that ASAP is a sound and robust assessment model.

The application of ASAP for Witch Flounder was rejected by the panel, and this reviewer agrees with the decision. The main reason for the decision was the major retrospective pattern (Figure B154).

A strong retrospective pattern is an indication of a mismatch between the data and model. The model is not sufficiently describing the data generating system. Notice that special cases of this are if the data are biased compared to what the model is expecting, or if the model is expecting two data series to show similar trends, but they are conflicting. The cause for a retrospective pattern is often that something is changing over time in the real system, but assumed to be constant in the model. Such things could for instance be natural mortality, catchability/selectivity, age assignment, relative weight of different data sources, or misreporting.

The working group studied several ways of reducing the retrospective pattern (e.g., changing natural mortality and setting a catch multiplier). The working group hereby demonstrated that these changes could diminish the retrospective pattern, but the approaches required large multipliers (of 4 or 3), and did not provide a convincing answer to what is really causing the retrospective pattern observed. Furthermore, any combination of these factors (and the further ones mentioned above) could likely be causing the observed retrospective pattern.

The working group suggested a way to compensate for the retrospective pattern by adjusting the final year's estimate by the average of the most recent seven years' retrospective bias (rho-adjustment). This is an intuitively appealing approach, but the retrospective bias is caused by something that is not described in the model, and hence it can only be predicted in an ad hoc manner. Using a seven year average is arbitrary. It is easy to imagine situations where it would be misleading. Imagine for example: 1) A situation where the assessment model was too conservative, so the model would overestimate when the population was decreasing, but underestimate when the population was increasing. If the population started to increase after a period of decrease, then the rho-adjustment would make the bias worse. 2) A situation where the assessment model is biased towards a specific value, then as soon as that value is crossed then the retrospective pattern starts to point in the opposite direction.

Here are a few further observations about the model: The model residuals show some auto-correlated and systematic patterns, which is not uncommon in assessment models, but still indicative of a some mis-specification. The relative weights of the different data sources are largely determined by user supplied assumptions of variance parameters and effective sample sizes. Setting variance parameters and effective sample sizes is fairly common practice, but it weakens the inference about quantities of interest, because 1) the confidence intervals are determined by propagating the assumed uncertainties through the model, and as such are conditioned on the assumed values. 2) In the case of conflicting data sources changing the relative weights changes the estimates themselves. The estimated catchability of around 4 for the swept area scaled survey is high compared to the expected value of 1.

The selectivity is configured in time blocks 82-92, 93-04, and 05-15. The estimated selectivity curves show a gradual change towards older ages. This discrete way to configure time changing selectivity limits the flexibility, because new model parameters are needed in each time block. Alternative approaches to configuring time varying selectivities include using splines, or using time-series models (state-space models) to setup time-varying fishing mortality processes.

In the assessment report the working group prepared several alternative methods: a virtual population analysis (VPA), a statistical catch at age (SCAA), a replacement yield (RY) approach, and an empirical approach (EA). The VPA and the SCAA are age-based models and in the assessment report they were successfully set up to match the ASAP model base case. In most runs they show similar trends and similar problems as the ASAP model. In one of the sensitivity runs of the SCAA (sens7) the retrospective is reduced by including a dome-shaped selectivity pattern - and as such was informative - to show yet another mechanism, which could lead to the observed retrospective pattern. The RY and the EA are both simple age aggregated approaches and both do not provide biological reference points, but can be used to set catch advice.

This reviewer supports the review panel's recommendation that the NEFMC SSC consider using the empirical approach (EA) as the basis for developing management advice.

The sens7 run of the SCAA was expanded as part of the public comment period in a working paper submitted on 21 Nov. 2016. The model reduced the retrospective pattern and reduced the estimated catchability from 4 to around 3. These are great improvements and further help illustrate possible mechanisms for the retrospective pattern. The configuration adjustments (on old age natural mortality and doming) seem arbitrary and could be further validated (or falsified), e.g., by simulations. For instance, the controversial doming of the selectivity: 1) The working group used catch curve analysis to argue that such doming is not likely to occur, but would such catch curve analysis be able to identify it if it was occurring? To answer that questions a catch curve analysis could be conducted on simulated data from the SCAA model with the estimated amount of doming. 2) Conversely, simulated data from the flat-topped ASAP model could be given to the SCAA model with doming to see if that model would then postulate that doming was occurring.

5. State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; point estimates or proxies for BMSY, BTHRESHOLD, FMSY and MSY) and provide estimates of their uncertainty. If analytic model- based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

This TOR was completed satisfactorily, but the ASAP model proposed by the working group was rejected by the review panel, because of a major retrospective pattern. The previously accepted VPA showed similar problems with the current data, so there is no accepted basis for biological reference points.

The empirical approach to be considered does not supply biological reference points. The absolute level of the biomass estimate is very uncertain, because the scaling to an absolute level is based on the estimated survey catchability from the swept area study. The relative estimate does indicate that the stock is at low historical levels, but stable over the last almost 10 years.

Another consequence of the large uncertainty with respect to the absolute level in the empirical approach is that the previously established Fmsy proxy (based on F40%) should not be used. The scale is different. Instead the working group's suggestion of using the recent relative exploitation rate should be considered.

6. Evaluate stock status with respect to the existing model (from previous peer reviewed accepted assessment) and with respect to a new model (or possibly models, in accord with guidance in attached "Appendix to the SAW Assessment TORs") developed for this peer review. In both cases, evaluate whether the stock is rebuilt.
    a. When working with the existing model, update it with new data and evaluate stock status (overfished and overfishing) with respect to the updated BRP estimates.
    b. Then use the newly proposed model (or possibly models, in accord with guidance in "Appendix to the SAW Assessment TORs") and evaluate stock status with respect to "new" BRPs and their estimates (from TOR-5).

This TOR was completed satisfactorily, but the model proposed by the working group was rejected by the review panel, because of a major retrospective pattern. The previously accepted VPA showed similar problems with the current data, so there is no accepted basis for biological reference points.

Before being rejected by both the old VPA with new data and the new rho-adjusted ASAP, methods showed that that the stock was overfished and that overfishing was occurring. The empirical approach to be considered does not supply biological reference points and as such cannot evaluate the status. Relative trends show that the stock is at low historical levels, but stable over the last almost 10 years.

7. Develop approaches and apply them to conduct stock projections.
    a. Provide numerical annual projections (3 years) and the statistical distribution (e.g., probability density function) of the catch at FMSY or an FMSY proxy (i.e. the overfishing level, OFL) (see Appendix). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, magnitude and variability in recruitment).
    b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions. Identify reasonable projection parameters (recruitment, weight-at- age, retrospective adjustments, etc.) to use when setting specifications.

c. Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC. The choice takes scientific uncertainty into account (see Appendix).

This TOR was completed satisfactorily, but age structured model proposed by the working group was rejected by the review panel, because of major retrospective patterns.

In the context of the rejected model, the uncertainty in the final year's estimate was represented by an MCMC sample from its posterior distribution (assessment rapport says it was a bootstrap sample, which is not accurate). The recruits used in the projections were samples from the smoothed empirical distribution of estimated recruits in the period 1982-2015. The estimation uncertainty and recruitment process uncertainty were propagated through the projections. The statistical distributions of the projected quantities were summarized by their medians and 90% confidence interval limits, and further by the probability of SSB falling below the biomass threshold in the projected years.

The empirical area-swept method to be considered does not offer an alternative, as it contains no process model for the stock dynamics, which is needed for short term projections.

The rejected model indicated that stock was below the biomass threshold. The empirical area-swept method to be considered does not provide a biomass threshold, but does indicate that the stock is at low historical levels.

8. Evaluate the validity of the current stock definition, taking into account what is known about migration, and make a recommendation about whether there is a need to modify the current stock definition for future stock assessments.

This TOR was completed satisfactorily.

The stock is managed as a unit stock.

No tagging or stock structure studies have been conducted in the Gulf of Maine-Georges Bank region. Individual studies (e.g., in the Newfoundland region) have indicated smaller sub-populations with relative little mixing, but until further evidence of sub-populations has been collected, the WG recommends to retain the current stock definition.

9. Review, evaluate and report on the status of research recommendations from the last peer reviewed benchmark stock assessment. Identify new research recommendations.

This TOR was completed satisfactorily.

The research recommendations from previous benchmarks are listed and progress on each recommendation is described. Further research recommendations from the assessment working group are put forward.

Existing recommendations include: Refining calibration factors, examine mean weight trends, research in causes for retrospective patterns, aging archived samples, stock identification, tagging, larval index, environmental/habitat preferences, influence of age-composition data, spatial modelling, and investigate plausible M changes.

This reviewer noted and supports that many of the recommendations relate to solving the major retrospective issue. This issue is seen in many stocks in the region, so any insight gained here would be widely beneficial. The panel recommends that this issue be addressed as a research track topic. Focus should be on identifying causes that could lead to such retrospective patterns, and then on evaluating how plausible each potential cause is. A list of scenarios to consider could include: Time evolving or mis-specified: catchability, selectivity, natural mortality, misreporting, or age assignment. The scenarios could be constructed via simulations to validate that they could cause such retrospective patterns. When evaluating how plausible each scenario is for real data it may be useful to run prediction-based validations (estimate from one part of the data and predict the remaining part). The panel is aware that this is a large undertaking and assessment history in the region shows that no quick fixes should be expected.

Appendix 1: Bibliography of materials provided for review

Black Sea Bass

Background Papers

Blaylock J, Shepherd GR. 2016. Evaluating the vulnerability of an atypical protogynous hermaphrodite to fishery exploitation: results from a population model for black sea bass (*Centropristis striata*). Fish Bull. 114:476–489.

Brooks EN et al. 2008. Stock assessment of protogynous fish: evaluating measures of spawning biomass used to estimate biological reference points. Fish Bull. 106:12–23.

Keigwin B, Shepherd GR, Wuenschel MJ. 2016. Geomorphometric analysis indicates overlap in body shape between sexes of black sea bass (*Centropristis striata*). US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-07; 26p.

Miller AS, Shepherd GR, Fratantoni PS. 2016. Offshore Habitat Preference of Overwintering Juvenile and Adult Black Sea Bass, *Centropristis striata*, and the Relationship to Year-Class Success. PLoS ONE 11(1): 19p.

Moser J, Shepherd GR. 2009. Seasonal Distribution and Movement of Black Sea Bass (*Centropristis striata*) in the Northwest Atlantic as Determined from a Mark-Recapture Experiment. J Northw Atl Fish Sci. 40: 17–28.

Nieland JL, Shepherd GR. 2011. Comparing Black Sea Bass Catch and Presence Between Smooth and Structured Habitat in Northeast Fisheries Science Center Spring Bottom Trawl Surveys (Working Paper for SAW 53). 7p.

Northeast Fisheries Science Center. 2012. 53rd Northeast Regional Stock Assessment Workshop (53rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-03; 33p.

Shepherd, G., K. Shertzer, J. Coakley, and M. Caldwell (Editors). 2013. Proceedings from a workshop on modeling protogynous hermaphrodite fishes. Raleigh, NC. 33p.

Working Papers

Fay G. 2016. Retrospective analysis for Black sea bass Stock Synthesis model 'run_164'. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 6p.

Fay, G and Cadrin S. 2016. Simulation testing assessment models for Black Sea Bass. Appendix A6, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 26p.

Fay G, McNamee J, Cadrin S. 2016. Stock Synthesis Application to Black Sea Bass. Appendix A9, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 59p.

Fay G, McNamee J, Cadrin S. 2016. Stock Synthesis Application to Black Sea Bass. Appendix A9, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 59p.

Robillard E et al. 2016. Validation of Black Sea bass, Centropristis striata, Ages Using Oxytetracycline Marking and Scale Margin Increments. Appendix A1, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 18p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 247p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Stock Assessment Summary Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 8p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Port-Based Black Sea Bass Outreach Project. Appendix A2, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 21p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Investigating the utility of inshore trawl surveys for developing black sea bass abundance indices. Appendix A3, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 27p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Fishery Management History. Appendix A4, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 15p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Term of Reference 1 – Spatial Issues. Appendix A5, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 46p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Black sea bass distribution maps – Distribution of State and Federal surveys and NEFSC spring survey distribution maps, 1989-2015. Appendix A7, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 206p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. ALK simulation to test efficacy of multinomial approach. Appendix A8, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 19p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Overall Model of All Plots. Appendix A10, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 156p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. North Model of All Plots. Appendix A11, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 134p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. South Model of All Plots. Appendix A12, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 116p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. North Area Exchange of All Plots. Appendix A13, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 134p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. South Area Exchange of All Plots. Appendix A14, Stock Assessment Report of Black Sea Bass. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 116p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Two Area Model Justification. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 1p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Combined ASAP Retros. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 3 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Comparison of results for Black Sea Bass ASAP Two Area model and SS (run 134). SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 1p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Groundfish retro-adjusted values used in management. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 1p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Index tables. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 2p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. M Profile Obj FX Components. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 2p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Model Justification Diagnostics. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 8 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Normalized indices used in both North and South area models. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 4 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. SS comparisons. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 1p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Standardized Age Comp Residual Plots. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 18 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Stock recruit. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 2 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Black sea bass Z-score normalized index values. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 1 slide.

Presentations

Working Group, Stock Assessment Workshop (SAW 62). 2016. Black Sea Bass Assessment Review. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 261 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Commercial VTRs. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 40 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. VTR Trawl and Spring Survey. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 23 slides.

Witch Flounder

Background Papers

Butterworth DS and Rademeyer RA. 2016. Further Remarks on Gulf of Maine-Georges Bank Witch Flounder Assessment Results. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 12p.

Cadrin S and Wright B. 2016. Fishery Catch Rates of Working Flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 17p.

DeCelles G. 2016. An Assessment of Witch Flounder (*Glyptocephalus cynoglossus*) Stock Structure. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 18p.

Friedland K. 2016. Data to inform habitat model construction for witch flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 23p.

Friedland K. 2016. Estimated witch flounder habitat using random forest models. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 15p.

Hare J et al. 2016. In situ temperature and salinity data for use in stock assessments. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 4p.

Hare J et al. 2016. Empirical estimates of maximum catchability of Witch Flounder *Glyptocaphalus cynoglossus L.* on the Northeast Fisheries Science Center Fall bottom trawl survey. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 27p.

Hare J et al. 2016. Environmentally explicit stock-recruitment relationships in Witch Flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 5p.

Kritzer JP et al. 2016. Spatial and Temporal Patterns in Habitat Use and Depth Distribution of Witch Flounder: Implications for Stock Assessment. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 11p.

Northeast Fisheries Science Center. 2008. Assessment of 19 Northeast Groundfish Stocks through 2007: Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008. US Dep Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 08-15; 884 p + xvii.

Northeast Fisheries Science Center. 2012. Assessment or Data Updates of 13 Northeast Groundfish Stocks through 2010. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-06; 789 p.

Northeast Fisheries Science Center. 2015. Operational Assessment of 20 Northeast Groundfish Stocks, Updated Through 2014. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-24; 251 p.

Odell J et al. 2016. NSC-AFM-GFCPF Witch Flounder Letter. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 2p.

Palmer MC. 2016. Catch curve analysis of witch flounder fishery and survey catch-at-age data. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 9p.

Richardson D. 2016. A minimum estimate of Witch Flounder spawning stock biomass using experimental estimates of catchability on the NEFSC trawl survey. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 4p.

Terceiro M. 2016. TOR 1: Description of commercial fishery Dealer Report trawl gear landings and effort and modeling landings rate (LPUE) data for witch flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 21p.

Terceiro M. 2016. TOR 1: Description of commercial fishery Dealer Report trawl gear landings and effort and modeling landings rate (LPUE) data for witch flounder: 'Directed' Trips (=>40% of trip landings). Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 11p.

Terceiro M. 2016. TOR 1 & 2: Modeling commercial fishery Dealer Report fish trawl gear landings rate (LPUE) data for witch flounder: 'Directed' Trips (=>40%, =>25%, and =>10% of trip landings). Working Paper for SAW/SARC 62. Nov 29 – Dec 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 27p.

Terceiro M. 2016. TOR 1: Description and modeling of NEFOP (Observer) fish trawl gear catch rate (CPUE) data for witch flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 17p.

Terceiro M. 2016. TOR 1 & 2: Description of Vessel Trip Report trawl gear catch and effort data and modeling catch rates (CPUE) for witch flounder. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 30p.

Walsh HJ et al. 2016. Changes in the distributions of larval, juvenile, and adult witch flounder in the Northeast US Shelf Ecosystem: Updates Through 2015. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 9p.

Wigley SE. 2016. Rough vs Smooth Bottom Type: An Initial Exploration. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 15p.

Wigley SE and Burnett JM. 2016. Preliminary Estimates of Biological and Yield Characteristics of Deep-water Witch Flounder (Glyptocephalus cynoglossus) in the Georges Bank-Mid-Atlantic Bight Region. J Northw Atl Fish Sci. 31:181-194.

Wigley SE. 2016. Refinements to 1982-2014 Witch Flounder Discard Estimates. Working Paper for SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 39p.

Wigley SE, Brodziak JKT,Col L. 2003. Assessment of the Gulf of Maine and Georges Bank witch flounder stock for 2003. Northeast Fish. Sci. Cent. Ref. Doc. 03-14; 186p.

Working Papers

Butterworth DS and Rademeyer RA. 2016. Response to reviewer requests in regard to the impact of selectivity doming in the preferred SCAA model. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 4p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Stock Assessment of Witch Flounder for 2016. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 523p.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Stock Assessment Summary of Witch Flounder for 2016. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. 16p.

Presentations

Hare J et al. 2016. Empirical Estimates of Maximum Catchability of Witch Flounder on the Northeast Fisheries Science Center Fall Bottom Trawl Survey. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 23 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Witch Flounder Assessment Review, TORs 1-3. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 89 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Witch Flounder Assessment Review, TORs 4-9. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 123 slides.

Working Group, Stock Assessment Workshop (SAW 62). 2016. Witch Flounder SARC Discussion Slides. SAW/SARC 62. November 29 – December 2, 2016. NOAA Fisheries, Northeast Fisheries Science Center. Woods Hole, MA. Power Point presentation. 32 slides.

Appendix 2: Statement of Work for Anders Nielsen

Statement of Work for Dr. Anders Nielsen

National Oceanic and Atmospheric Administration (NOAA)

National Marine Fisheries Service (NMFS)

Center for Independent Experts (CIE) Program

External Independent Peer Review

62nd Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC) Benchmark stock assessment for Black sea bass and Witch flounder

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards. (http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf).

Further information may be obtained from www.ciereviews.org.

Scope

The Northeast Regional Stock Assessment Review Committee (SARC) meeting is a formal, multiple-day meeting of stock assessment experts who serve as a panel to peer-review tabled stock assessments and models. The SARC peer review is the cornerstone of the Northeast Stock Assessment Workshop (SAW) process, which includes assessment development and report preparation (which is done by SAW Working Groups or ASMFC technical committees), assessment peer review (by the SARC), public presentations, and document publication. This review determines whether or not the scientific assessments are adequate to serve as a basis for developing fishery management advice. Results provide the scientific basis for fisheries within the jurisdiction of NOAA's Greater Atlantic Regional Fisheries Office (GARFO).

The purpose of this meeting will be to provide an external peer review of a benchmark stock assessment for **Black sea bass and Witch flounder**. The requirements for the peer review follow. This Statement of Work (SOW) also includes Appendix 1: TORs for the stock assessment, which are the responsibility of the analysts; Appendix 2: a draft meeting agenda; Appendix 3: Individual Independent Review Report Requirements; and Appendix 4: SARC Summary Report Requirements.

Requirements

NMFS requires three reviewers under this contract (i.e. subject to CIE standards for reviewers) to participate in the panel review. The SARC chair, who is in addition to the three reviewers, will be provided by either the New England or Mid-Atlantic Fishery Management Council's Science and Statistical Committee; although the SARC chair will be participating in this review, the chair's participation (i.e. labor and travel) is not covered by this contract.

Each reviewer will write an individual review report in accordance with the SOW, OMB Guidelines, and the TORs below. All TORs must be addressed in each reviewer's report. No more than one of the reviewers selected for this review is permitted to have served on a SARC panel that reviewed this same species in the past. The reviewers shall have working knowledge and recent experience in the application of modern fishery stock assessment models. Expertise should include forward projecting statistical catch-at-age models. Reviewers should also have experience in evaluating measures of model fit, identification, uncertainty, and forecasting. Reviewers should have experience in development of Biological Reference Points (BRPs) that includes an appreciation for the varying quality and quantity of data available to support estimation of BRPs. For Black sea bass, knowledge of spatial models and complex fisheries with multiple fleets and recreational fisheries would be useful. For Witch flounder, knowledge of flatfish ecology would be useful.

Requirements for Reviewers

- Review the background materials and reports prior to the review meeting
- Attend and participate in the panel review meeting
    - The meeting will consist of presentations by NOAA and other scientists, stock assessment authors and others to facilitate the review, to provide any additional information required by the reviewers, and to answer any questions from reviewers
- Reviewers shall conduct an independent peer review in accordance with the requirements specified in this SOW and TORs, in adherence with the required formatting and content guidelines; reviewers are not required to reach a consensus.
- Each reviewer shall assist the SARC Chair with contributions to the SARC Summary Report
- Deliver individual Independent Review Reports to the Government according to the specified milestone dates
- This report should explain whether each stock assessment Term of Reference of the SAW was or was not completed successfully during the SARC meeting, using the criteria specified below in the "Requirements for SARC panel."
- If any existing Biological Reference Points (BRP) or their proxies are considered inappropriate, the Independent Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be identified, then the report should indicate that the existing BRPs are the best available at this time.
- During the meeting, additional questions that were not in the Terms of Reference but that are directly related to the assessments may be raised. Comments on these questions should be included in a separate section at the end of the Independent Report produced by each reviewer.
- The Independent Report can also be used to provide greater detail than the SARC Summary Report on specific stock assessment Terms of Reference or on additional questions raised during the meeting.

Requirements for SARC panel

- During the SARC meeting, the panel is to determine whether each stock assessment Term of Reference (TOR) of the SAW was or was not completed successfully. To make this determination, panelists should consider whether the work provides a scientifically credible basis for developing fishery management advice. Criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable. If alternative assessment models and model assumptions are presented, evaluate their strengths and weaknesses and then recommend which, if any, scientific approach should be adopted. Where possible, the SARC chair shall identify or facilitate agreement among the reviewers for each stock assessment TOR of the SAW.

- If the panel rejects any of the current BRP or BRP proxies (for B_{MSY} and F_{MSY} and MSY), the panel should explain why those particular BRPs or proxies are not suitable, and the panel should recommend suitable alternatives. If such alternatives cannot be identified, then the panel should indicate that the existing BRPs or BRP proxies are the best available at this time.
- Each reviewer shall complete the tasks in accordance with the SOW and Schedule of Milestones and Deliverables below.

Requirements for SARC chair and reviewers combined:

Review both the Assessment Report and the draft Assessment Summary Report. The draft Assessment Summary Report is reviewed and edited to assure that it is consistent with the outcome of the peer review, particularly statements that address stock status and assessment uncertainty.

The SARC Chair, with the assistance from the reviewers, will write the SARC Summary Report. Each reviewer and the chair will discuss whether they hold similar views on each stock assessment Term of Reference and whether their opinions can be summarized into a single conclusion for all or only for some of the Terms of Reference of the SAW. For terms where a similar view can be reached, the SARC Summary Report will contain a summary of such opinions. In cases where multiple and/or differing views exist on a given Term of Reference, the SARC Summary Report will note that there is no agreement and will specify - in a summary manner – what the different opinions are and the reason(s) for the difference in opinions.

The chair's objective during this SARC Summary Report development process will be to identify or facilitate the finding of an agreement rather than forcing the panel to reach an agreement. The chair will take the lead in editing and completing this report. The chair may express the chair's opinion on each Term of Reference of the SAW, either as part of the group opinion, or as a separate minority opinion. The SARC Summary Report will not be submitted, reviewed, or approved by the Contractor.

If any existing Biological Reference Points (BRP) or BRP proxies are considered inappropriate, the SARC Summary Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be identified, then the report should indicate that the existing BRP proxies are the best available at this time.

Foreign National Security Clearance

When reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for reviewers who are non-US citizens. For this reason, the reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, country of birth, country of citizenship, country of permanent residence, country of current residence, dual citizenship (yes, no), passport number, country of passport, travel dates.) to the NEFSC SAW Chair for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/ and http://deemedexports.noaa.gov/compliance_access_control_procedures/noaa-foreign-national-registration-system.html. The contractor is required to use all appropriate methods to safeguard Personally Identifiable Information (PII).

Place of Performance

The place of performance shall be at the contractor's facilities, and at the Northeast Fisheries Science Center in Woods Hole, Massachusetts.

Period of Performance

The period of performance shall be from the time of award through January 15, 2017. Each reviewer's duties shall not exceed 16 days to complete all required tasks.

Schedule of Milestones and Deliverables: The contractor shall complete the tasks and deliverables in accordance with the following schedule.

No later than October 26, 2016	Contractor sends reviewer contact information to the COR, who then sends this to the NMFS Project Contact
No later than November 15, 2016	NMFS Project Contact will provide reviewers the pre-review documents
Nov. 29 – Dec. 2, 2016	Each reviewer participates and conducts an independent peer review during the panel review meeting in Woods Hole, MA
December 2, 2016	SARC Chair and reviewers work at drafting reports during meeting at Woods Hole, MA, USA
December 16, 2016	Reviewers submit draft independent peer review reports to the

	contractor's technical team for review
December 16, 2016	Draft of SARC Summary Report, reviewed by all reviewers, due to the SARC Chair *
December 23, 2016	SARC Chair sends Final SARC Summary Report, approved by reviewers, to NMFS Project contact (i.e., SAW Chairman)
December 30, 2016	Contractor submits independent peer review reports to the COR and technical point of contact (POC)
January 6, 2017	The COR and/or technical POC distributes the final reports to the NMFS Project Contact and regional Center Director

* The SARC Summary Report will not be submitted to, reviewed, or approved by the Contractor.

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards:

(1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each TOR as specified; (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

All travel expenses shall be reimbursable in accordance with Federal Travel Regulations (http://www.gsa.gov/portal/content/104790). International travel is authorized for this contract. Travel is not to exceed $23,000.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

Project Contacts

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Appendix 1. Terms of Reference for the SAW Working Group (62nd SAW/SARC Stock Assessment)

The SARC Review Panel shall assess whether or not the SAW Working Group has reasonably and satisfactorily completed the following actions.

A. Black sea bass

1. Summarize the conclusions of the February 2016 SSC peer review regarding the potential for spatial partitioning of the black sea bass stock. The consequences for the stock assessment will be addressed in TOR-6.)

2. Estimate catch from all sources including landings and discards. Characterize the uncertainty in these sources of data. Evaluate available information on discard mortality and, if appropriate, update mortality rates applied to discard components of the catch. Describe the spatial and temporal distribution of fishing effort.

3. Present the survey data being used in the assessment (e.g., indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of fishery dependent indices as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.

4. Consider the consequences of environmental factors on the estimates of abundance or relative indices derived from surveys.

5. Investigate implications of hermaphroditic life history on stock assessment model. If possible, incorporate parameters to account for hermaphroditism.

6. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock), using measures that are appropriate to the assessment model, for the time series (integrating results from TORs-1,-4, & -5 as appropriate), and estimate their uncertainty. Include a historical retrospective analysis and past projection performance evaluation to allow a comparison with most recent assessment results.

7. Estimate biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY}, and MSY), including defining BRPs for spatially explicit areas if appropriate, and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the appropriateness of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

8. Evaluate overall stock status with respect to a new model or new models that considered spatial units developed for this peer review.

9. Develop approaches and apply them to conduct stock projections.

    a. Provide numerical annual projections (3-5 years) and the statistical distribution (e.g., probability density function) of the OFL (overfishing level) that fully incorporates observation, process and model uncertainty (see Appendix to the SAW TORs). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment, and definition of BRPs for black sea bass).

    b. Comment on which projections seem most realistic. Consider major uncertainties in the assessment as well as the sensitivity of the projections to various assumptions.

    c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

10. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

B. Witch flounder

1. Estimate catch from all sources including landings and discards. Describe the spatial and temporal distribution of landings, discards, and fishing effort. Characterize the uncertainty in these sources of data.

2. Present available federal, state, and other survey data, indices of relative or absolute abundance, recruitment, etc. Characterize the uncertainty and any bias in these sources of data and compare survey coverage to locations of fishery catches. Select the surveys and indices for use in the assessment.

3. Investigate effects of environmental factors and climate change on recruitment, growth and natural mortality of witch flounder. If quantifiable relationships are identified, consider incorporating these into the stock assessment.

4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from TOR-3 if appropriate), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous

assessment results and previous projections. Compare F's and SSB's that were projected during the previous assessment to their realized values.

5. State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY} and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

6. Evaluate stock status with respect to the existing model (from previous peer reviewed accepted assessment) and with respect to a new model (or possibly models, in accord with guidance in attached "Appendix to the SAW Assessment TORs") developed for this peer review. In both cases, evaluate whether the stock is rebuilt .

    a. When working with the existing model, update it with new data and evaluate stock status (overfished and overfishing) with respect to the updated BRP estimates.

    b. Then use the newly proposed model (or possibly models, in accord with guidance in "Appendix to the SAW Assessment TORs") and evaluate stock status with respect to "new" BRPs and their estimates (from TOR-5).

7. Develop approaches and apply them to conduct stock projections.

    a. Provide numerical annual projections (3 years) and the statistical distribution (e.g., probability density function) of the catch at F_{MSY} or an F_{MSY} proxy (i.e. the overfishing level, OFL) (see Appendix). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, magnitude and variability in recruitment).

    b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions. Identify reasonable projection parameters (recruitment, weight-at-age, retrospective adjustments, etc.) to use when setting specifications.

    c. Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC. The choice takes scientific uncertainty into account (see Appendix).

8. Evaluate the validity of the current stock definition, taking into account what is known about migration, and make a recommendation about whether there is a need to modify the current stock definition for future stock assessments.

9. Review, evaluate and report on the status of research recommendations from the last peer reviewed benchmark stock assessment. Identify new research recommendations.

Clarification of Terms

used in the SAW/SARC Terms of Reference

Guidance to SAW WG about "Number of Models to include in the Assessment Report":

In general, for any TOR in which one or more models are explored by the WG, give a detailed presentation of the "best" model, including inputs, outputs, diagnostics of model adequacy, and sensitivity analyses that evaluate robustness of model results to the assumptions. In less detail, describe other models that were evaluated by the WG and explain their strengths, weaknesses and results in relation to the "best" model. If selection of a "best" model is not possible, present alternative models in detail, and summarize the relative utility each model, including a comparison of results. It should be highlighted whether any models represent a minority opinion.

On "Acceptable Biological Catch" (DOC Nat. Stand. Guidel. Fed. Reg., v. 74, no. 11, 1-16-2009):

Acceptable biological catch (ABC) is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of Overfishing Limit (OFL) and any other scientific uncertainty…" *(p. 3208) [In other words, OFL ≥ ABC.]*

ABC for overfished stocks. For overfished stocks and stock complexes, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan. *(p. 3209)*

NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. (p. 3180)

ABC refers to a level of ''catch'' that is ''acceptable'' given the ''biological'' characteristics of the stock or stock complex. As such, Optimal Yield (OY) does not equate with ABC. The specification of OY is required to consider a variety of factors, including social and economic factors, and the protection of marine ecosystems, which are not part of the ABC concept. (p. 3189)

On "Vulnerability" (DOC Natl. Stand. Guidelines. Fed. Reg., v. 74, no. 11, 1-16-2009):

"Vulnerability. A stock's vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of

the stock to produce Maximum Sustainable Yield (MSY) and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality).” (p. 3205)

Participation among members of a Stock Assessment Working Group:

Anyone participating in SAW meetings that will be running or presenting results from an assessment model is expected to supply the source code, a compiled executable, an input file with the proposed configuration, and a detailed model description in advance of the model meeting. Source code for NOAA Toolbox programs is available on request. These measures allow transparency and a fair evaluation of differences that emerge between models.

Appendix 2. Draft Review Meeting Agenda

{Final Meeting agenda to be provided at time of award}

62nd Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC) Benchmark stock assessment for A. Black sea bass and B. Witch flounder

Nov. 29 – Dec. 2, 2016

Stephen H. Clark Conference Room – Northeast Fisheries Science Center

Woods Hole, Massachusetts

DRAFT AGENDA* (version: Dec. 17, 2015)

TOPIC	PRESENTER(S)	SARC LEADER	RAPPORTEUR

<u>**Tuesday, Nov. 29**</u>

10 – 10:30 AM

Welcome	**James Weinberg**, SAW Chair		
Introduction	**Pat Sullivan,** SARC Chair		
Agenda			
Conduct of Meeting			
10:30 – 12:30 PM	Assessment Presentation (A. Black sea bass)		
	Gary Shepherd		**TBD**

12:30 – 1:30 PM Lunch

1:30 – 3:30 PM Assessment Presentation (A. Black sea bass)

Gary Shepherd **TBD**

3:30 – 3:45 PM Break

3:45 – 5:45 PM SARC Discussion w/ Presenters (A. Black sea bass)

Pat Sullivan, SARC Chair **TBD**

5:45 – 6 PM Public Comments

TOPIC	PRESENTER(S)	SARC LEADER	RAPPORTEUR

<u>Wednesday, Nov. 30</u>

8:30 – 10:30 AM Assessment Presentation (B. Witch flounder)

Susan Wigley **TBD**

10:30 – 10:45 AM Break

10:45 – 12:30 PM Assessment Presentation (B. Witch flounder)

Susan Wigley **TBD**

12:30 – 1:30 PM Lunch

1:30 – 3:30 PM SARC Discussion w/presenters (B. Witch flounder)

Pat Sullivan, SARC Chair **TBD**

3:30 – 3:45 PM Public Comments

3:45 -4 PM Break

4 – 6 PM Revisit with Presenters (A. Black sea bass)

Pat Sullivan, SARC Chair **TBD**

7 PM **(**Social Gathering**)**

TOPIC	PRESENTER(S)	SARC LEADER	RAPPORTEUR

Thursday, Dec. 1

8:30 – 10:30 Revisit with Presenters (B. Witch flounder)

Pat Sullivan, SARC Chair **TBD**

10:30 – 10:45 Break

10:45 – 12:15	Review/Edit Assessment Summary Report (A. Black sea bass)	
	Pat Sullivan, SARC Chair	**TBD**
12:15 – 1:15 PM	Lunch	
1:15 – 2:45 PM	(cont.) Edit Assessment Summary Report (A. Black sea bass)	
	Pat Sullivan, SARC Chair	**TBD**
2:45 – 3 PM	Break	
3 – 6 PM	Review/edit Assessment Summary Report (B. Witch flounder)	
	Pat Sullivan, SARC Chair	**TBD**

<u>Friday, Dec. 2</u>

9:00 AM – 5:00 PM SARC Report writing **

*All times are approximate, and may be changed at the discretion of the SARC chair. The meeting is open to the public.

**During the SARC Report writing stage, the public should not engage in discussion with the SARC.

Appendix 3. Individual Independent Peer Review Report Requirements

1. The independent peer review report shall be prefaced with an Executive Summary providing a concise summary of whether they accept or reject the work that they reviewed, with an explanation of their decision (strengths, weaknesses of the analyses, etc.).

2. The report must contain a background section, description of the individual reviewers' roles in the review activities, summary of findings for each TOR in which the weaknesses and strengths are described, and conclusions and recommendations in accordance with the TORs. The independent report shall be an independent peer review, and shall not simply repeat the contents of the SARC Summary Report.

    a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including a concise summary of whether they accept or reject the work that they reviewed, and explain their decisions (strengths, weaknesses of the analyses, etc.), conclusions, and recommendations.

    b. Reviewers should discuss their independent views on each TOR even if these were consistent with those of other panelists, but especially where there were divergent views.

    c. Reviewers should elaborate on any points raised in the SARC Summary Report that they believe might require further clarification.

    d. The report may include recommendations on how to improve future assessments.

3. The report shall include the following appendices:

Appendix 1: Bibliography of materials provided for review

Appendix 2: A copy of this Statement of Work

Appendix 3: Panel membership or other pertinent information from the panel review meeting.

Appendix 4. SARC Summary Report Requirements

1. The main body of the report shall consist of an introduction prepared by the SARC chair that will include the background and a review of activities and comments on the appropriateness of the process in reaching the goals of the SARC. Following the introduction, for each assessment reviewed, the report should address whether or not each Term of Reference of the SAW Working Group was completed successfully. For each Term of Reference, the SARC Summary Report should state why that Term of Reference was or was not completed successfully.

   To make this determination, the SARC chair and reviewers should consider whether or not the work provides a scientifically credible basis for developing fishery management advice. If the reviewers and SARC chair do not reach an agreement on a Term of Reference, the report should explain why. It is permissible to express majority as well as minority opinions.

   The report may include recommendations on how to improve future assessments.

2. If any existing Biological Reference Points (BRPs) or BRP proxies are considered inappropriate, include recommendations and justification for alternatives. If such alternatives cannot be identified, then indicate that the existing BRPs or BRP proxies are the best available at this time.

3. The report shall also include the bibliography of all materials provided during the SAW, and relevant papers cited in the SARC Summary Report, along with a copy of the Statement of Work.

   The report shall also include as a separate appendix the assessment Terms of Reference used for the SAW, including any changes to the Terms of Reference or specific topics/issues directly related to the assessments and requiring Panel advice.

Appendix 3: Panel members and other participants.

SAW-SARC 62 ATTENDEES
NOVEMBER 29 – DECEMBER 2, 2016

James Weinberg	NEFSC
Russ Brown	NEFSC
Gary Shepherd	NEFSC
Mark Terceiro	NEFSC
Susan Wigley	NEFSC
Tony Wood	NEFSC
Kiersten Curti	NEFSC
Sheena Steiner	NEFSC
Chris Legault	NEFSC
Sarah Gaichas	NEFSC
Alicia Miller	NEFSC
Paul Nitzschke	NEFSC
Chuck Adams	NEFSC
Loretta O'Brien	NEFSC
John Maniscalco	NYDEC
Jamie Cournane	NEFMC
Kiley Dancy	MAFMC
Patricia Perez	NEFOP
Steve Cadrin	SMAST
Vivian Haist	Centre for Independent Experts (Reviewer)
Anders Nielsen	Centre for Independent Experts (Reviewer)
Neil Klaer	Centre for Independent Experts (Reviewer)
Pat Sullivan	NEFMC (SARC Chair)
Kirby Rootes-Murdy	ASMFC
Rich McBride	NEFSC
Nichola Meserve	MA DMF
Ashley Weston	SMAST
Greg Power	GARFO
Liz Daskey	Cornell Univ
Bob Glenn	MA DMF
Larry Alade	NEFSC
Mike Radziszewski	NEFOP
Brandon Muffley	MAFMC
Katherine Sosebee	NEFSC
Heath Cook	NEFSC

Tim Miller	NEFSC
Gavin Fay	UMASS Dartmouth
Greg DeCelles	MA DMF
Jackie Odell	NSC

Vito Giacalone	NSC
Liz Brooks	NEFSC
Brooke Wright	SMAST
Aja Szumylo	GARFO
Dave Richardson	NEFSC
Harvey Walsh	NEFSC
Amanda Hart	UMASS Dartmouth
Hannah Goodale	GARFO
Jessica Blaylock	NEFSC
Melanie Griffin	